DOCUMENT RESUME

ED 259 515 EC 180 251

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TITLE A Glitch or a Goodie: Secondary Teachers' Views of Computer Software for Secondary Special Education Students.
PUB DATE Jan 85
NOTE 13p.; Paper presented at the Special Education Software Center Conference (Alexandria, VA, June 6-7, 1985).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Computer Assisted Instruction; *Computer Software; *Disabilities; High Schools; Secondary School Teachers; *Teacher Attitudes

ABSTRACT

High school teachers (N=21) who used microcomputers in instruction with mainstreamed low ability students were polled regarding their attitudes toward and experiences with software. Results revealed considerable variance regarding instructional time involving the computer, a preponderance of drill and practice uses over other applications (such as teaching new skills, reviewing material, problem solving, and behavior management), use of a mix of commercially produced and teacher developed software, little use of hardware enhancements (such as input and output devices), and preference for software design that re-taught content in a different manner after initial student error. Implications include the importance of teacher control over the software, age-appropriateness, emphasis on instruction in process skills along with content facts, and a "user-friendly" nature. (CL)

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A Glitch or a Goodie: Secondary Teachers' Views of Computer Software for Secondary Special Education Students

by Sherry L. Liebes, Ed.D.

"I hope to make France so prosperous that every peasant will have a chicken in his pot on Sunday."

Henri IV, King of France (1589-1610), speaking at his coronation

" A chicken in every pot."

Republican campaign slogan, 1932

Several weeks ago, while reading in the dentist's office, Henri IV's famous quotation came to mind. I had opened a periodical to a two-page full color advertizement. The scene depicted a typical nineteenth century one-room schoolhouse. All the familiar symbols of learning and teaching were present. The teacher's desk was large and cluttered with papers. The blackboard, which was still black in those days, harbored the next morning's exercises. Student desks were wooden and arranged in uncompromisingly straight rows. Only one object suggested this was a contemporary scene. There was a computer on every desk!

The educational community seems to have borrowed from Henri IV and the 1932 Republican Party when searching for a slogan for the current "computer mania" (Noble, 1985). Recent reports of increased computer sales indicate that a computer on every desk may become reality before long. At the high school level, for example, the porportion of public secondary schools having at least one microcomputer for instructional purposes rose from 80.5% in 1983 to 93.1% in 1984 (Chion-Kenney, 1985). Elementary schools have experienced similar increases in hardware acquisitions.

While sales of computers to schools have skyrocketed, the public debate surrounding their entry into classrooms has fizzled. Discussions over whether or not the microcomputer will substantially impact education have become fewer and fewer (Roblyer, 1981). Marcus (Winter, 1984/85) notes several recent authors critical of computer-assisted instruction (CAI). But these writers are in the minority, he feels, and represent a "fashionable" backlash" to the popular groundswell of support for the emergence of the computer into today's classrooms.

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A Glitch or a Goodie?

Where software is concerned, however, teachers are not as unanimously approving. Although the educational applications of computers have gained initial support among teachers, the value of current software products is still debated. The jury is still out on the question of whether or not educational software is a "glitch" that impedes the learning process or a "goodie" that makes teaching and learning easier. It appears that we are moving closer to having a computer on every desk but teachers are questioning whether or not we will have quality software to put in every computer.

Software appropriate for use with special education students has come under the same scrutiny as those products designed for regular education students. It is difficult, in fact, to discover software designed specifically for special needs students (Hannaford, 1983; Taymans and Malouf, 1984). Many products are developed by persons with little knowledge of the unique learning requirements of special education students (Taber, 1983). Special educators often are in a position of purchasing courseware that does not meet the special physical and learning needs of their students. Regular educators are also looking for software products that address the learning requirements of handicapped students, particularly those mildly impaired and learning disabled students who are integrated into their classrooms.

This article describes software preferences of high school teachers who teach low ability students. An overview of the research regarding computer use at the high school level will provide perspective for these educators' views of software qualilty. The results of previous attempts to assess teachers' opinions of software quality also will be reported. Finally, the findings of this researcher's survey of high school teachers regarding their software preferences will be detailed. Suggestions for future software development based on this research will conclude the discussion.

Patterns in Classroom Computer Use

Recently, experts have cataloged how high school teachers use the microprocessor for instruction in the classroom. Studying useage patterns can provide information for the software developer regarding those software characteristics teachers find most beneficial for students. Teacher software preferences are shown by who they use software with, how they integrate it into their other instructional activities and how much time they allot to this technology. Although useage patterns are sometimes determined by availability of software rather than product preference, this research should not be overlooked by software publishers.

Computers are employed in the classroom in a variety of ways. Dudoff (1982) delineates six modes of delivery as described by other researchers: drill and practice, tutorial, educational games,

simulations, problem-solving and computer-managed instruction. Teachers included in this study of high school educators reported utilizing one or several of these modes in planning and delivering instruction in their classrooms. Educators who applied this technology solely for record-keeping purposes or as a tool to teach programming in business courses were not considered in this research.

It is important to note which departments within a school are using the computer in instruction. Although virtually all subject areas have been touched by this technology, teachers seem to prefer using the computer when teaching math and science more than other subjects (Rude-Parkins, 1983). Anderson and Smith (1984) surveyed 200 Texas school districts that were known to employ computers in their instructional program. At the high school level, computers were used to teach math (80% of the respondents reported uses in this area), Computer Literacy (60%), English/Language Arts (28%), Science (29%), and Business Education (30%).

Certain trends are also evident regarding how the teacher uses the microprocessor with high school students. Applications commonly mentioned by secondary principals include programming , basic skills instruction, simulations and enrichment activities (Blaschke, 1979). However, drill and practice predominates the applications (Karoff, 1983; Hassett, 1984). The Center for Social Organization of Schools (1983), in a national survey, interviewed computer- using secondary teachers. Of the teachers surveyed, 91% said they used the computer to teach programming. The next most commonly reported application was drills and remedial work (43%), followed by "games" (22%) and "word processing and lab tool" (12%) as the least popular uses.

Shavelson et al. (1984) documented four major instructional uses of computers in their study of California high school math and science teachers. The largest group of teachers employed the computer as an "enrichment" tool to familiarize students with the microcomputer. This group of teachers did very little to integrate the computer into regular curriculum activities. The second largest group of teachers, the "orchestration" cluster, closely linked computer useage to daily classroom plans. Teachers in the "adjunct instruction" cluster used the microprocessor to supplement their lessons in math and science. The fourth group integrated the computer into regular classroom activities but stressed the "drill and practice" approach.

Instructional decisions regarding computer use are often affected by student characteristics such as grade level, race and academic ability. Generally, computer usage increases with grade level (Anderson and Smith, 1984). Elementary students are most likely to experience the computer as part of the regular instructional program while secondary students will use the computer most regularly for attaining computer literacy. Students in special education programs have the least access to the computer (Rude-Parkins, 1983). Minorities and students who do not speak English also tend to be short changed (Anderson and Smith, 1984). Perhaps one of the most disquieting findings is that students in classes labled low ability, high minority receive computer instruction in the drill and practice

format while low ability, non-minority students gain experience with tutorials, simulations and games in addition to drill and practice exercises (Shavelson, 1983).

Individual student time on the computer tends to increase as the student enters high school. An elementary school student can plan on using a computer for about 30 minutes a week, while his secondary school counterpart may use the computer up to 45 minutes weekly. Additionally, as elementary schools gain new computers, they tend to put more students on them for the same amounts of time. In contrast, a secondary school that makes new computer acquisitions will provide the same number of students computer access for longer periods of time (Center for Social Organizagion of Schools, 1983). These computer usage patterns are probably caused by elementary teachers tendancies to use the computer for drill and practice exercises while secondary teachers use the computer for programming.

When summarizing data about high school instructional computer usage, it is helpful to refer to Taylor's (1980) famous taxonomy. Are teachers employing the microprocessor as "a tool, tutor or tutee"? The predominate applications of programming and drill and practice put the computer in the category of instructional tutor. Some teachers are experimenting with data and word processing (tool) and with student designed programs (tutee) but these teachers are exceptions. Usually, educators are teaching with a computer about a computer. We are not seeing widespread integration of the computer into high school curriculums.

In fact, it is often difficult to find teachers who have truely integrated the computer into their classrooms and curriculum. Teachers who become proficient in instructional applications of this technology tend to leave the classroom for other endeavors (Shavelson, 1984). Some schools have bought microprocessors but have stored them away. These facts take on additional meaning when one realizes that the teachers using microprocessors now are, for the most part, individually motivated to do so. The next wave of microprocessor users may do so as the result of school system mandates and may be less inherently captivated than earlier users by the technology (Marcus, 1985).

Research on Teachers' Opinions of Software

Many reviews of software describe the products in less than glowing terms. Blaschke (1979) surveyed 1200 educators and found they felt that poor quality software was the major bottleneck limiting expanded use of the microcomputer in classrooms. The National Educators Association also surveyed teachers regarding their views of software. The teachers polled expressed dissatisfaction with both the quality and quanity of software (Gold, 1984).

Criticisms of the soundness of the instructional principles upon which software is designed are frequent (Budoff, 1982; Hannaford,1984). Software content is often poorly sequenced

(Robleyer, 1981) and narrow in scope (Caldwell, 1980). Also, experts feel that current software is often little more than a mechanized workbook that does not make the best use of the uniqueness of the computer as a tool for learning (Boettcher,1983). Special education teachers are also concerned that few software products are tested and validated with handicapped students (Hofmeister, 1982).

Recently, teachers have been asked to describe the characteristics of beneficial educational software for use at the high school level. Shavelson's study in California included querying teachers about their recommendations for teacher-friendly software. This study deserves attention because it documents views of teachers who have frequent experiences with computers and students.

These teachers commented on both the structure and content of software. They voiced strong support for "crashproof" programs that would not stop running for unknown reasons. They wanted content that could be modified but that was closely coordinated with curriculum. Concepts and problem-solving skills should be included along with the presenting facts. After student performance diagnositics are completed, branching and difficulty level should be adjusted. Use of graphics, sound and color were mentioned as being desirable in appropriate contexts. Finally, the design, selection and evaluation processes should include teachers.

The Survey Sample and Method

Researchers are beginning to document teacher preferences in software. Questions remain, however, about how teachers view this technology when the student exhibits low academic performance. Specifically, what are the software preferences of secondary teachers who teach mainstreamed low ability students?

This researcher polled high school teachers who utilized the computer instructionally with low ability students. The intent of the questioning was to identify secondary teacher preferences in quality software for use with these students. For purposes of this research, teachers were instructed to consider students as "low ability" if they were grouped with other low achieveing students or if the teacher knew that the student was low achieving through other sources, such as grades or records reviews. No distinction was made between the "low ability" and "low achieving" labels. No attempt was made to identify only special education students or even to verify if, in fact, the students actually had low abilities. The significant variable was the teacher's perception that the student was low achieving.

The scarcity of computer-using secondary teachers has been noted. This study had the the additional constraints of finding teachers who used the computer instructionally and with low ability students. Therefore, several methods were utilized to identify successful teachers appropriate for this study. Initially, high school administrators were solicited for nominations. Additional names were gleaned from conversations with those teachers originally recommended.

School district supervisors, higher education institution personnel and local computer users group representatives were queried. Also, selected attendees at a national educational computer conference were asked for their help in the selection process. Finally, several teachers whose efforts at computer instruction were described in educational computing magazines were contacted. Each teacher was mailed a survey to complete. Follow-up informal interviews were conducted with 30% of the respondents.

The study sample consisted of twenty-one teachers who responded to the survey, "Classroom Use of Computers with Secondary Slow Learner Students". The response rate was 65%. Teachers were drawn from the states of Maryland, Pennsylvania and Illinois, as well as the District of Columbia. Five public school districts and four private schools were represented. Eighteen of the respondents taught regular education classes in comprehensive high school settings. Of the three special educators, one worked in a public special center, one worked in a private special center and one taught in a regular high school with mainstreamed special students. Fivty-seven percent of the respondetns labeled themselves as math or science teachers, with the remainder of the sample coming from a variety of subject areas. Each teacher reported utilizing the microcomputer instructionally in their classroom with low ability students.

Several educators who were not full-time teachers were interviewed regarding their opinions about educational software. The views of these "expert practitioners" (See figure 1) were considered separately from the teachers polled. There was some curiosity on the part of the researcher as to how these professionals' views compared with those of the teachers.

Figure 1

EXPERT PRACTITIONERS

TITLE	ORGANIZATION
Instructional data systems	School district
Professor of education	College
Director	Private school
Science center coordinator	School district
Technology trainer	School district

Survey Results

This survey provides data regarding the respondents' instructional applications of computers and their preferences in software for use with low ability students. Instructional time involving the computer varied considerably within the group (See figure 2). Over half of the teachers reported using the microcomputer at least twice a week. However, the other half of the group used it much less frequently, sometimes as little as once a month.

Figure 2

Frequency of Use

Time	% of Respondents
Twice weekly	24%
Once weekly	9%
Once monthly	4%
Other	24%

The survey group used the computer with their students in several ways (see figure 3). Drill and practice activities, despite their generally negative reviews by others, were used more consistently by this group than were other approaches. Teaching new skills and reviewing previously learned material were also popular applications. Conversely, less than one-third of the respondents viewed the machine as a behavior management tool.

Figure 3

Instructional Applications

Application	% of respondents
Drill and Practice	67%
Teach new skills	61%
Review material	61%
Problem-solving	47%
Simulations	38%
Programming	34%
Behavior Management	29%

Teachers used a mix of commercially produced and teacher developed software. However, over half (52%) reported using commercial software frequently or most of the time as compared to 47% who used teacher developed software. Although there are large numbers of teachers who are using software that they or their collegues have developed, they report doing this without using an authoring system. Fully 86% of the respondents said they do not use an authoring system. However, those few teachers who do use them seem to feel that they are helpful.

Characteristics of preferred software of the sampled teachers can be categorized according to documentation, hardware enhancements, friendliness and design. Overwhelmingly, teachers (76%) expressed that it was "highly desirable" for software to include an outline of the disc contents. Additionally, 66% of the participants requested that student worksheets related to disc contents be included. Also, suggestions for integrating software with regular curriculum materials was valued by the respondents (61%).

Teachers reported little use of hardware enhancements such as input and output devices. Speech synthesizers and touch screens were highly desired by only 28% and 29% of the teachers respectively.

High school teachers in this study held strong preferences for software that provided them options for structuring the student's learning experience. These "friendly" attributes of software include adaptable content (80% of the teachers strongly desired this aspect), graphics to reinforce learning (61%), adjustable student response rate (61%) and program shutdown at specified points for teacher review of student progress (42%).

Finally, teachers were asked to rate certain aspects of software design for desirability of use with low ability students. Teachers (76%) were highly supportive of discware that re-taught content in a differenct manner after initial student error. As mentioned, teachers like drill and practice (57%) and simulation (47%) activities for use with their students. Regular reinforcement (57%) was considered more desireable than random reinforcement (28%). Regarding student assessment, less than one-half of the teachers (42%) requested that pre- and post-tests be included on the software.

Follow-up interviews with the respondents and conversations with the expert practitioners generally served to support and amplify the survey results. As a group, the expert practitioners expressed more concern than did the teachers regarding the pedagogical soundness of the software. Teachers were interested in the software being well designed, but they also wanted the product to reflect their teaching strategies as much as those of learning theorists. The experts, as the teachers, were emphatic that the software be easy to use and non-threatening to a novice computer-user. "It should self-boot. It should self-everything!" was one comment. Although teachers of low ability students are using drill and practice activities with their

students, the expert practitioners forecast that problem-solving and data gathering applications are the wave of the future.

Implications for Future Software Development

It is clear that secondary teachers who teach low ability students have definite opinions about the characteristics of quality software. Several trends were noted. Generally, teachers want to feel that they have some control over the software. One teacher commented that she wanted the software "to teach math exactly the way I teach it." If the content or instructional approach does not blend with the teacher's strategies, then the teacher wants the option of modifying the software to reflect their personal approach.

Software publishers must offer software that is closely aligned to curriculum. Although teachers are aware of authoring systems and prefer software whose content is easily modified, educators complain they lack sufficient time to create or alter software. Therefore, teachers are looking for products that have "staying power." As one teacher remarked, "Software is too expensive to buy if I can't use it each year."

It is important to high school teachers that software is age-appropriate for their students. Particularly regarding reinforcement strategies, teachers wished that software considered the particular needs of the adolescent. For example, using graphics was generally viewed positively but teachers were concerned that graphics should be used sparingly and with some purpose. One teacher felt that ndary students responded best to "what we've been doing all along ades", rather than to exotic grahpics as motivation and reinforcement. Most of all, reinforcement should be positive but not so interesting that students sabotage programs to view the reinforcement.

Perhaps one of the strongest requests from teachers was for software producers to design software that taught process skills along with content facts. While there was much criticism of poorly written drill and practice- type programs, teachers still seemed comfortable with that approach under certain conditions. However, teachers seemed to feel that their students would also benefit from simulations and other problem-solving formats that involved higher order thinking skills.

Finally, teachers wanted software packages to be designed with the new-computer user in mind. The "second wave" computer teacher has been described. More and more frequently, the teacher using the computer instructionally in the classroom will be the teacher required to do so. An intrinsic interest in or knowledge of how to infuse this technology into the classroom may not be present. Software products that help the teacher feel comfortable with this technology, through clear, concise documentation and instructionally honest programs, will be the products that teachers choose to use in their classrooms now and in the future.

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Paper presented at the Special Education Software Center Conference

Alexandria, VA, June 6-7, 1985